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POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

Postal Rate and Fee Changes, 2000

Docket No. R2000-1

DIRECT TESTIMONY OF
JENNIFER J. XIE
ON BEHALF OF THE
UNITED STATES POSTAL SERVICE

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LIST OF ASSOCIATED LIBRARY REFERENCES

The following library references are associated with my testimony:

- USPS-LR-I-49/R2000-1 TRACS Commercial Air Subsystem Statistical and Computer Documentation (Source Code and Data on CD-ROM)
- USPS-LR-I-50/R2000-1 TRACS Passenger Rail (Amtrak) Subsystem Statistical and Computer Documentation (Source Code and Data on CD-ROM)
- USPS-LR-I-51/R2000-1 TRACS Network Air Subsystem Statistical and Computer Documentation (Source Code and Data on CD-ROM)
- USPS-LR-I-52/R2000-1 TRACS Highway Subsystem Statistical and Computer Documentation (Source Code and Data on CD-ROM)
- USPS-LR-I-53/R2000-1 TRACS Freight Rail Statistical and Computer Documentation (Source Code and Data on CD-ROM)
- USPS-LR-I-54/R2000-1 Estimation of Priority Mail Weight and Average Haul by Zone - Documentation and Source Code (1 CD-ROM included)
- USPS-LR-I-63/R2000-1 TRACS-CODES Computer System Documentation
- USPS-LR-I-64/R2000-1 TRACS-CODES Computer System Source Code (CD-ROM)

DIRECT TESTIMONY
OF
JENNIFER J. XIE

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5 AUTOBIOGRAPHICAL SKETCH

6 My name is Jennifer J. Xie. I am a Mathematical Statistician in Cost
7 Systems, Finance. Since joining the Postal Service in 1995, I have worked on
8 statistical design and estimation issues for the Transportation Cost System,
9 Origin-Destination Information System, the Revenue, Pieces and Weight System,
10 and the System for International Revenue and Volume Outbound. I have served
11 as project manager for the Transportation Cost System since August 1997.

12 Prior to joining the Postal Service, I was employed as a senior Load
13 Research Analyst by the Potomac Electric Power Company (PEPCO). My
14 primary responsibility at PEPCO was to conduct statistical analyses using
15 customer billing and survey information to quantify energy reductions attributable
16 to various conservation programs. I also provided technical support in several
17 PEPCO rate case proceedings.

18 I received a B.S. in Electrical Engineering from Jiangsu Institute of
19 Technology, China, in 1982 and a M.S. in System Engineering from Hohai
20 University, China, in 1987. I earned a Ph.D. in Operations Research and Applied
21 Statistics from George Mason University in 1992. I am a member of the
22 American Statistical Association and the Washington Statistical Society.

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PURPOSE AND SCOPE

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The purpose of my testimony is to describe the Transportation Cost System (TRACS), which is a statistical information system used to distribute base year (BY) purchased transportation costs to mail categories. TRACS is composed of five distinct subsystems: Highway, Freight Rail, Passenger Rail (Amtrak), Commercial Air and Network Air. All five subsystems are continuous, ongoing survey systems designed to collect data from the different transportation modes. Each subsystem employs its own survey design and estimation procedures. My testimony covers the general design for each subsystem, the types of estimates each produces, and tables of major estimates and confidence limits.

1 I. HIGHWAY

2 The TRACS-Highway subsystem produces separate distribution keys for
3 four types of purchased highway contracts: Inter-BMC¹, Intra-BMC, Inter-SCF²,
4 and Intra-SCF. The cost for each contract type is composed of one or more
5 accounts. The universe under study is all mail moved on contracts whose costs
6 accrue to these accounts:

7 Inter-BMC: Account Number 53131;

8 Intra-BMC: Account Number 53127;

9 Inter-SCF: Account Numbers 53124, 53609, 53614, and 53618;

10 Intra-SCF: Account Numbers 53121, 53601, and 53605.

11 The primary sampling unit (PSU) for all four contract types is the route-
12 trip-stop-day, which is defined as all mail unloaded from a truck at one facility on
13 a specific trip, on a specific day. The survey design is essentially the same for all
14 the contract types, though each of them has its own sampling frame. Each
15 highway sampling frame is a list of stop-days³. There are three major steps
16 involved in constructing the sampling frames. In the first step, routing and
17 operation information is extracted from the National Air and Surface System⁴
18 (NASS) for all the highway contract routes that are expected to be in operation in
19 the upcoming quarter. The information extracted from NASS includes the route
20 number, the trip number, the facilities where the vehicle stops, and the days of a

¹ Bulk Mail Center.

² Sectional Center Facility.

³ Abbreviated name for route-trip-stop-days

⁴ See Section III and Appendix I-1 of TRACS Highway Subsystem Statistical and Computer Documentation, filed as USPS-LR-I-52, for additional details.

1 week when the trip operates. In the second step, account information is
2 extracted from the Highway Pay Master File⁵ for the same contract routes. The
3 account information is used to group the contracts into the four contract types. In
4 the third and final step, the ZIP Code and facility type are extracted from the
5 postal Administrative File⁶ for each stop on a route. The facility information is
6 used for stratifying the sampling frame, as well as for administering the survey.

7 The sample design consists of three stages. In the first stage, within each
8 contract type, the stop-days are stratified based on the facility type of the stop
9 and whether the trip is inbound or outbound. A systematic random sample of
10 stop-days is selected from each stratum. In the second stage, for each selected
11 stop-day, a subsample of wheeled containers, pallets and loose items⁷ off-loaded
12 at the test facility is selected. From selected containers, a third stage sample of
13 items is selected. For pallets and loose items selected at the second stage,
14 there is no third stage sample. All selected mail is recorded.

15 Weight and volume information by mail category is recorded for the
16 contents of sampled items. For sampled pallets, the dimensions of the pallet and
17 the proportion of the pallet's space occupied by each mail category are recorded.
18 In order to develop estimates of cubic-foot-miles, data collectors also record the
19 facility where the item, or the pallet, was loaded onto the vehicle (to establish
20 miles traveled) and the percent of vehicle floor occupied by palletized mail,

⁵ See Section III and Appendix I-2 of TRACS Highway Subsystem Statistical and Computer Documentation, filed as USPS-LR-I-52, for additional details.

⁶ See Section III and Appendix I-3 of TRACS Highway Subsystem Statistical and Computer Documentation, filed as USPS-LR-I-52, for additional details

⁷ Items include pieces, parcels, bundles, sacks, trays, or tubs. Items that are not in wheeled containers or on pallets are called loose items.

1 containerized items, and loose items (to establish cubic-feet utilized). Data are
2 recorded directly into portable microcomputers using the Computerized On-Site
3 Data Entry System (CODES) software. From the sample data, the cubic-foot-
4 miles transported for each contract type are estimated by mail category.

5 Distribution keys are calculated by dividing the mail category cubic-foot-
6 miles by the total cubic-foot-miles. Separate distribution keys are calculated for
7 each quarter for each of the four contract types, and are used to distribute
8 quarterly costs by contract types. Annual costs, shown in Tables 1-4⁸, are the
9 sums of the quarterly costs. The confidence intervals of annual costs, also
10 shown in Tables 1-4, are derived from the coefficients of variation (CVs) of the
11 quarterly distribution keys.

12 A more detailed description of the TRACS-Highway sample design and
13 estimation methodology is contained in Sections I-VII of Library Reference
14 USPS-LR-I-52, TRACS Highway Subsystem Statistical and Computer
15 Documentation. TRACS data collection procedures are detailed further in
16 Chapter 5 of Handbook F-65, filed as Library Reference USPS-LR-I-18. The
17 CODES-TRACS software, used on laptop computers to record the data, is
18 documented in Section 1 of Library Reference USPS-LR-I-63.

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⁸ The costs shown in Tables 1-4 are slightly different from the costs in the Cost Segment 14 B workpapers (the transportation model). The former reflect revisions that correct for a minor program error which was discovered after the Cost Segment 14 B workpapers were finalized. Cost Segment 14 B workpaper costs are shown in Table 10, for reference purposes.

1 II. FREIGHT RAIL

2 The TRACS-Rail subsystem produces distribution keys for the Inter-BMC
3 freight rail account (53143). The universe under study is all mail transported via
4 freight rail whose costs accrue to this account. The PSU for freight rail is the
5 origin-destination-day, which is defined as all mail being transported from a given
6 origin BMC to a given destination on a given day. While highway transportation
7 is contracted by route, with one route consisting of multiple trips and stops,
8 freight rail is contracted between one origin and one destination. A trip between
9 the origin and the destination facility is referred to as a rail movement. The
10 freight rail sampling frame is a list of all origin-destination-days (movements) with
11 a BMC origin which are not destined for a mail bag depository or mailer's plant,
12 and are not used exclusively for empty equipment. The freight rail sampling
13 frame is developed using 12 weeks of historical records from the Rail
14 Management Information System⁹ (RMIS). The information extracted from RMIS
15 includes the origin BMC, the destination facility, the date of arrival, the number of
16 vans on the movement, and the cost of the movement.

17 The sample design consists of four stages. In the first stage, a random
18 sample of rail movements is selected from the sampling frame. In the second
19 stage, one van is randomly selected from the vans on the selected movement. In
20 the third stage, a subsample of wheeled containers, pallets and loose items off-
21 loaded from the test van is selected. From selected containers, a fourth stage
22 sample of items is selected. For pallets and loose items selected at the third

1 stage, there is no fourth stage sample. All selected mail is recorded. The freight
2 rail sample design at the third and fourth stages is the same as the highway
3 sample design at the second and third stages.

4 Weight and volume information by rate category is recorded for the
5 contents of sampled items. For sampled pallets, the dimensions of the pallet and
6 the proportion of the pallet's space occupied by each mail category are recorded.
7 Data collectors also record the percent of van floor space occupied by palletized
8 mail, containerized items, and loose items. Data are recorded directly into
9 portable microcomputers using CODES software.

10 The sample data are expanded, by mail category, to the cubic-foot-miles
11 of the test van. The cost for the trip is multiplied by the cubic-foot-mile
12 proportions to estimate mail category costs for the trip. The costs for tested trips
13 are then expanded to represent all trips in the quarter.

14 Distribution keys are calculated by dividing the expanded costs for a mail
15 category by the total expanded costs. Separate distribution keys are calculated
16 for each quarter, and are used to distribute quarterly costs. Annual costs, shown
17 in Table 5, are the sum of quarterly costs. The confidence intervals for annual
18 costs, also shown in Table 5, are derived from the CVs of the quarterly
19 distribution keys.

20 A more detailed description of the TRACS-Rail sample design and
21 estimation methodology is contained in Sections I-V of Library Reference USPS-
22 LR-I-53, TRACS Freight Rail Subsystem Statistical and Computer

⁹ See Section II-1 and Appendix I-2 of TRACS Freight Rail Subsystem Statistical and Computer

1 Documentation. TRACS data collection procedures are detailed further in
2 Chapter 5 of Handbook F-65, filed as Library Reference USPS-LR-I-18. The
3 CODES-TRACS software, used on laptop computers to record the data, is
4 documented in Section 1 of Library Reference USPS-LR-I-63.

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6 III. PASSENGER RAIL (AMTRAK)

7 The TRACS-Amtrak subsystem produces distribution keys for the
8 passenger rail service account, 53142. The universe under study is all mail
9 transported via Amtrak whose costs accrue to this account. In fiscal year 1998,
10 the Postal Service contracted for mail transportation on 48 Amtrak trains. Each
11 of them makes multiple trips a week along the same route; from a specific origin,
12 stopping at various points en route, to a final destination.

13 The PSU is a trip, which consists of all mail unloaded from an Amtrak train
14 at all the stops along a specific trip. A trip is uniquely determined by its train
15 number and the day the train departs. It can extend over more than one
16 calendar date. The sampling frame is a list of trips. It is developed by extracting
17 the routing and operation information for all Amtrak trains in the NASS database.
18 Information extracted from NASS includes the train number, the frequency (days
19 of a week when the train departs), the origin, cities at which it stops, and the
20 arrival time for each stop. The 48 trains are divided into two groups (low cost

1 and high cost) based on their contract costs obtained from the Amtrak Train Cost
2 File¹⁰.

3 The sample design consists of three stages. At the first stage, one trip per
4 quarter is selected from each low cost train and two trips from each high cost
5 train. At the second stage, a subsample of wheeled containers, pallets and loose
6 items is selected from the mail off-loaded from one car at each stop. From
7 selected containers, a third stage sample of items is selected. There is no third
8 stage sample for pallets and loose items selected at the second stage. All
9 selected mail is recorded. The Amtrak sample design at the second and third
10 stages is essentially the same as the Highway sample design.

11 Weight and volume information by rate category is recorded for the
12 contents of sampled items. For sampled pallets, the dimensions of the pallet and
13 the proportion of the pallet's space occupied by each mail category are recorded.
14 To permit estimation of square-foot-miles, data collectors also record the facility
15 where the item, or the pallet, was loaded onto the train (to establish the miles
16 traveled) and the total number of containers and loose items off-loaded from the
17 entire train (to establish the square-feet utilized). Data are recorded directly into
18 portable microcomputers using CODES software.

19 The sample data are expanded, by mail category, to the square-foot-miles
20 of the sampled trip. Mail category proportions of square-foot-miles are calculated
21 for each sampled trip. Mail category proportions are averaged over sampled
22 trips for each train, and multiplied by the train cost to estimate the mail category

¹⁰See Section I and Appendix I of TRACS Passenger Rail (Amtrak) Subsystem Statistical and

1 cost for the train. The distribution key is calculated by dividing the sum of mail
2 category costs for the 48 trains by the total Amtrak cost. Separate distribution
3 keys are calculated for each quarter, and are used to distribute quarterly costs.
4 Annual costs, shown in Table 6, are the sum of quarterly costs. The confidence
5 intervals for annual costs, also shown in Table 6, are derived from the CVs of the
6 quarterly costs.

7 A more detailed description of the TRACS-Amtrak sample design and
8 estimation methodology is contained in Sections I-VII of Library Reference
9 USPS-LR-I-50, TRACS Passenger Rail (Amtrak) Subsystem Statistical and
10 Computer Documentation. TRACS data collection procedures are detailed
11 further in Chapter 5 of Handbook F-65, filed as Library Reference USPS-LR-I-18.
12 The CODES-TRACS software, used on laptop computers to record the data, is
13 documented in Section 1 of Library Reference USPS-LR-I-63.

14

15 IV. COMMERCIAL AIR

16 The TRACS-Air subsystem produces distribution keys for commercial air
17 transportation costs. The universe under study is all mail transported under
18 purchased transportation contracts on passenger airlines from a domestic origin
19 to a domestic destination. It does not include mail traveling via air taxi or the
20 Eagle, Western or Christmas Networks. The PSU is a flight-day, and is defined
21 as all mail being dispatched from the specified origin on a given day via a
22 particular airline and flight with the same first-leg destination reflected on the

1 routing label. The sampling frame is constructed by extracting the recent
2 dispatch records from the Air Contract Support System¹¹ (ACSS). ACSS
3 maintains the routing information (carrier, origin, destination, and date of the
4 flight) about an individual dispatch, and specifies the gross weight and primary
5 mail class for all items in the dispatch. Flights whose schedules continue through
6 the upcoming postal quarter according to the Official Airline Guide (OAG) are
7 eligible for sampling.

8 The sample design consists of two stages. In the first stage, a random
9 sample of flight-days is selected from the sampling frame. In the second stage,
10 for each selected flight-day, a subsample of mail items dispatched for that flight is
11 selected for detailed sampling.

12 Dispatch information is recorded for each selected item. Weight and
13 volume information, by mail category, is then recorded for the contents of the
14 item. The dispatch information is used in the expansion process to link the
15 sample data with the dispatch records in the ACSS file. Data are recorded
16 directly into a portable microcomputer using CODES software.

17 The sample data are expanded, by rate category, to the pound-miles of
18 mail on the test flight, and then to the total pound-miles of mail for the quarter.
19 ACSS records are used to determine the pound-miles of mail for the test flight, as
20 well as the total pound-miles for the quarter.

21 Distribution keys are calculated by dividing the expanded pound-miles for
22 a mail category by the total expanded pound-miles. Separate distribution keys

¹¹ See Section III and Appendix 1-A of TRACS Commercial Air Subsystem Statistical and

1 are calculated for each quarter, and are used to distribute quarterly costs.
2 Annual costs, shown in Table 7, are the sum of the quarterly costs. The
3 confidence intervals for annual costs, also shown in Table 7, are derived from the
4 CVs of the quarterly costs.

5 A more detailed description of the TRACS-Air sample design and
6 estimation methodology is contained in Sections I-VII of Library Reference
7 USPS-LR-I-49, TRACS Commercial Air Subsystem Statistical and Computer
8 Documentation. TRACS data collection procedures are detailed further in
9 Chapter 5 of Handbook F-65, filed as Library Reference USPS-LR-I-18. The
10 CODES-TRACS software, used on laptop computers to record the data, is
11 documented in Section 1 of Library Reference USPS-LR-I-63.

12

13 V. NETWORK AIR

14 The TRACS-Network Air subsystem produces two sets of distribution
15 keys, one for the Eagle Network and one for the Western Network. The universe
16 under study is all mail transported on the Eagle and Western Networks whose
17 costs accrue to the following accounts:

18 53541: Eagle Network Line Haul.

19 53543: Eagle Network Terminal Handling.

20 53545: Western Network Line Haul.

21 53546: Western Network Terminal Handling.

22 53547: Eagle Network Fuel.

1 It does not include mail transported on passenger airlines. Unlike
2 commercial airline flights, network flights are dedicated fully to transporting mail
3 between the hub and one or more cities in the network. The hub for the Eagle
4 Network is Indianapolis, Indiana; for the Western Network, it is Oakland,
5 California. The sample design for each network is the same.

6 The PSU is a city-day, which consists of all mail dispatched via network
7 flights from that city to the hub (as the first leg flight) on the specified day. The
8 sampling frame is a list of such city-days, and is constructed by extracting the
9 network flight data from the NASS database. For each network city, NASS
10 specifies the flight number, hub destination, flight frequency (days of a week
11 when the flight runs), and the closeout time. Each city is sampled three times per
12 quarter.

13 The sample design consists of two stages. In the first stage, for each city
14 in the network, three days are randomly selected for sampling. In the second
15 stage, a subsample of mail items dispatched via the network flight to the hub is
16 selected for detailed sampling.

17 Dispatch information is recorded for each selected item. Weight and
18 volume information, by rate category, is then recorded for the contents of the
19 item. The dispatch information is used in the expansion process to link the
20 sample data with the dispatch records in the ACSS file. Data are recorded
21 directly into a portable microcomputer using CODES software.

22 The sample data are expanded, by rate category, to the pound-miles of
23 mail on the test flight, and then to the total pound-miles of mail transported on the

1 network during the quarter. ACSS records are used to determine the pound-
2 miles of mail for the test flight, as well as the total pound-miles for the quarter, for
3 the respective networks.

4 Distribution keys are calculated by dividing the expanded pound-miles for
5 a mail category by the total expanded pound-miles. Separate distribution keys
6 are calculated for each network for each quarter, and are used to distribute
7 quarterly non-premium costs. Annual costs, shown in Tables 8-9, are the sum of
8 the quarterly costs. The confidence intervals for annual costs, also shown in
9 Tables 8-9, are derived from the CVs of the quarterly costs.

10 A more detailed description of the TRACS-Network Air sample design and
11 estimation methodology is contained in Sections I-VII of Library Reference
12 USPS-LR-I-51, TRACS Network Air Subsystem Statistical and Computer
13 Documentation. TRACS data collection procedures are detailed further in
14 Chapter 5 of Handbook F-65, filed as Library Reference USPS-LR-I-18. The
15 CODES-TRACS software, used on laptop computers to record the data, is
16 documented in Section 1 of Library Reference USPS-LR-I-63.

17

APPENDIX

Table 1. BY98 Inter-BMC Highway Costs and Confidence Intervals

Table 2. BY98 Intra-BMC Highway Costs and Confidence Intervals

Table 3. BY98 Inter-SCF Highway Costs and Confidence Intervals

Table 4. BY98 Intra-SCF Highway Costs and Confidence Intervals

Table 5. BY98 Freight Rail Costs and Confidence Intervals

Table 6. BY98 Passenger Rail (Amtrak) Costs and Confidence Intervals

Table 7. BY98 Commercial Air Costs and Confidence Intervals

Table 8. BY98 Eagle Network Costs and Confidence Intervals

Table 9. BY98 Western Network Costs and Confidence Intervals

Table 10. Highway Costs Shown in BY98 Transportation Model

Table 1. BY98 Inter-BMC Highway Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.136	9,012	12,284	15,555
1C Presort Letters	0.152	3,691	5,260	6,830
1C Single-Piece Cards	0.371	70	257	444
1C Presort Cards	0.504	4	298	591
Priority Mail	0.135	5,940	8,067	10,195
Express Mail	0.350	15	47	80
2C Periodicals	0.064	43,394	49,585	55,777
3C Single Piece Rate	0.243	4,392	8,379	12,366
3C Comm Std ECR	0.137	5,616	7,672	9,728
3C Comm Std Reg	0.070	52,046	60,350	68,654
3C Nonprofit ECR	0.241	672	1,277	1,881
3C Nonprofit Other	0.096	7,647	9,429	11,210
4C Parcels Zone Rate	0.053	54,526	60,867	67,208
4C Bound Printed Matter	0.084	9,533	11,406	13,278
4C Special Std	0.078	15,151	17,898	20,645
4C Library Mail	0.129	2,206	2,951	3,695
4C USPS Penalty	0.310	243	619	994
Free for the Blind	0.389	73	308	543
International	0.228	1,280	2,318	3,356
Total		215,512	259,271	303,030

Table 2. BY98 Intra-BMC Highway Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.110	13,397	17,089	20,781
1C Presort Letters	0.131	6,408	8,621	10,834
1C Single-Piece Cards	0.392	124	536	947
1C Presort Cards	0.535	-	200	410
Priority Mail	0.106	14,694	18,531	22,368
Express Mail	0.328	538	1,507	2,475
2C Periodicals	0.094	24,335	29,799	35,264
3C Single Piece Rate	0.165	3,240	4,782	6,325
3C Comm Std ECR	0.158	5,153	7,455	9,757
3C Comm Std Reg	0.082	39,286	46,767	54,248
3C Nonprofit ECR	0.429	118	738	1,358
3C Nonprofit Other	0.162	6,031	8,847	11,664
4C Parcels Zone Rate	0.053	77,379	86,355	95,330
4C Bound Printed Matter	0.088	13,314	16,087	18,859
4C Special Std	0.083	12,438	14,850	17,261
4C Library Mail	0.178	1,940	2,980	4,021
4C USPS Penalty	0.468	73	876	1,680
Free for the Blind	0.312	265	682	1,100
International	0.277	1,046	2,287	3,527
Total		219,778	268,989	318,210

Table 3. BY98 Inter-SCF Highway Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.052	96,566	107,482	118,399
1C Presort Letters	0.122	38,153	50,178	62,203
1C Single-Piece Cards	0.338	720	2,138	3,555
1C Presort Cards	0.484	70	1,372	2,675
Priority Mail	0.064	83,101	94,952	106,804
Express Mail	0.171	7,330	11,034	14,738
2C Periodicals	0.089	44,818	54,351	63,884
3C Single Piece Rate	0.332	2,804	8,048	13,292
3C Comm Std ECR	0.239	2,629	4,940	7,251
3C Comm Std Reg	0.134	21,709	29,446	37,183
3C Nonprofit ECR	0.664	-	1,381	3,177
3C Nonprofit Other	0.217	3,701	6,449	9,198
4C Parcels Zone Rate	0.132	15,341	20,711	26,080
4C Bound Printed Matter	0.265	2,252	4,677	7,101
4C Special Std	0.193	1,602	2,578	3,555
4C Library Mail	0.343	587	1,790	2,992
4C USPS Penalty	0.466	53	608	1,163
Free for the Blind	0.392	414	1,783	3,152
International	0.305	2,176	5,419	8,663
Total		324,025	409,337	495,065

Table 4. BY98 Intra-SCF Highway Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.056	94,190	105,912	117,635
1C Presort Letters	0.103	22,737	28,504	34,270
1C Single-Piece Cards	0.160	965	1,404	1,844
1C Presort Cards	0.231	362	660	959
Priority Mail	0.062	83,196	94,742	106,289
Express Mail	0.180	14,332	22,142	29,952
2C Periodicals	0.068	48,829	56,345	63,861
3C Single Piece Rate	0.333	1,099	3,155	5,211
3C Comm Std ECR	0.184	15,249	23,875	32,501
3C Comm Std Reg	0.100	46,050	57,321	68,592
3C Nonprofit ECR	0.413	236	1,234	2,232
3C Nonprofit Other	0.170	5,848	8,758	11,668
4C Parcels Zone Rate	0.085	56,087	67,240	78,394
4C Bound Printed Matter	0.166	8,921	13,226	17,531
4C Special Std	0.196	6,082	9,873	13,665
4C Library Mail	0.362	605	2,078	3,551
4C USPS Penalty	0.188	565	894	1,222
Free for the Blind	0.335	405	1,178	1,951
International	0.259	1,609	3,273	4,937
Total		407,366	501,814	596,262

Table 5. BY98 Freight Rail Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	81.667	-	171	27,613
1C Presort Letters	13.726	-	462	12,889
1C Single-Piece Cards	176.431	-	77	26,770
1C Presort Cards	78.464	-	92	14,232
Priority Mail	51.601	-	159	16,256
Express Mail	0.000	-	-	-
2C Periodicals	0.234	8,944	16,495	24,045
3C Single Piece Rate	0.909	-	5,636	15,681
3C Comm Std ECR	0.046	6,876	7,560	8,243
3C Comm Std Reg	0.008	55,574	56,442	57,310
3C Nonprofit ECR	0.505	11	1,055	2,098
3C Nonprofit Other	0.023	9,150	9,576	10,001
4C Parcels Zone Rate	0.025	26,405	27,754	29,102
4C Bound Printed Matter	0.109	6,592	8,387	10,182
4C Special Std	0.135	8,792	11,943	15,094
4C Library Mail	2.390	-	1,979	11,249
4C USPS Penalty	27.979	-	735	41,036
Free for the Blind	74.015	-	60	8,723
International	0.196	2,770	4,504	6,237
Total			153,085	

Table 6. BY98 Passenger Rail (Amtrak) Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.193	1,470	2,362	3,254
1C Presort Letters	0.064	3,032	3,463	3,894
1C Single-Piece Cards	0.236	11	21	31
1C Presort Cards	0.318	11	28	46
Priority Mail	0.144	1,440	2,004	2,569
Express Mail	0.000	-	-	-
2C Periodicals	0.018	57,165	59,283	61,401
3C Single Piece Rate	0.571	-	50	105
3C Comm Std ECR	0.150	214	302	391
3C Comm Std Reg	0.124	1,579	2,085	2,590
3C Nonprofit ECR	0.379	19	72	126
3C Nonprofit Other	0.237	227	424	621
4C Parcels Zone Rate	0.081	916	1,088	1,260
4C Bound Printed Matter	0.482	15	277	539
4C Special Std	0.379	19	74	130
4C Library Mail	0.468	1	9	18
4C USPS Penalty	0.696	-	1,166	2,756
Free for the Blind	1.026	-	7	22
International	0.115	250	323	395
Total			73,040	

Table 7. BY98 Commercial Air Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.144	167,932	233,898	299,865
1C Presort Letters	0.143	147,081	204,586	262,092
1C Single-Piece Cards	0.244	2,163	4,146	6,129
1C Presort Cards	0.372	1,032	3,807	6,581
Priority Mail	0.153	225,913	322,918	419,923
Express Mail	0.215	4,909	8,485	12,061
2C Periodicals	0.282	8,434	18,859	29,284
3C Single Piece Rate	0.380	292	1,145	1,999
3C Comm Std ECR	0.429	20	128	236
3C Comm Std Reg	0.246	6,416	12,391	18,366
3C Nonprofit ECR	0.481	1	22	43
3C Nonprofit Other	0.288	1,824	4,189	6,554
4C Parcels Zone Rate	0.576	-	2,350	5,001
4C Bound Printed Matter	0.378	311	1,200	2,089
4C Special Std	0.325	267	738	1,208
4C Library Mail	0.704	-	194	462
4C USPS Penalty	0.600	-	753	1,639
Free for the Blind	0.687	-	91	213
International	0.474	1,093	15,432	29,771
Total			\$ 835,331	

Table 8. BY98 Eagle Network Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.103	3,932	4,926	5,920
1C Presort Letters	0.110	5,955	7,598	9,242
1C Single-Piece Cards	0.364	33	113	194
1C Presort Cards	0.391	16	67	118
Priority Mail	0.048	29,739	32,823	35,907
Express Mail	0.051	15,291	16,986	18,680
2C Periodicals	0.213	167	286	405
3C Single Piece Rate	0.226	9	16	23
3C Comm Std ECR	0.494	0	7	15
3C Comm Std Reg	0.250	210	411	612
3C Nonprofit ECR	0.000	-	-	-
3C Nonprofit Other	0.266	69	145	221
4C Parcels Zone Rate	0.344	20	63	105
4C Bound Printed Matter	0.594	-	7	15
4C Special Std	0.370	3	11	19
4C Library Mail	0.545	-	8	16
4C USPS Penalty	0.331	203	579	954
Free for the Blind	0.508	0	3	5
International	0.258	2,773	5,617	8,461
Total			69,664	

Table 9. BY98 Western Network Costs and Confidence Intervals

Mail Category	CV	Lower 95% C.L. (\$1,000)	Cost (\$1,000)	Upper 95% C.L. (\$1,000)
1C Single-Piece Letters	0.227	237	428	618
1C Presort Letters	0.192	1,727	2,768	3,809
1C Single-Piece Cards	0.365	1	4	7
1C Presort Cards	0.905	-	82	226
Priority Mail	0.084	5,578	6,682	7,785
Express Mail	0.105	923	1,161	1,400
2C Periodicals	0.803	-	111	286
3C Single Piece Rate	0.594	-	1	3
3C Comm Std ECR	0.410	1	4	8
3C Comm Std Reg	0.599	-	82	177
3C Nonprofit ECR	0.000	-	-	-
3C Nonprofit Other	0.264	1	2	3
4C Parcels Zone Rate	0.415	0	3	5
4C Bound Printed Matter	0.000	-	-	-
4C Special Std	0.585	-	0	1
4C Library Mail	0.549	-	0	1
4C USPS Penalty	0.868	-	3	7
Free for the Blind	0.420	0	0	1
International	0.314	410	1,067	1,724
Total			12,398	

Table 10. Highway Costs Shown in BY98 Transportation Model

Mail Category	Inter-BMC Cost	Intra-BMC Cost	Inter-SCF Cost	Intra-SCF Cost
1C Single-Piece Letters	12,306	17,265	105,829	102,524
1C Presort Letters	5,277	8,583	48,369	28,672
1C Single-Piece Cards	253	512	1,997	1,232
1C Presort Cards	284	195	1,220	614
Priority Mail	8,195	18,364	93,835	91,391
Express Mail	46	1,505	16,033	21,468
2C Periodicals	49,266	29,663	53,525	60,004
3C Single Piece Rate	8,472	4,764	7,153	2,408
3C Comm Std ECR	7,572	7,525	5,646	24,711
3C Comm Std Reg	60,715	46,760	29,432	59,937
3C Nonprofit ECR	1,355	719	1,295	1,491
3C Nonprofit Other	9,470	8,702	6,304	8,782
4C Parcels Zone Rate	60,637	86,465	22,283	66,813
4C Bound Printed Matter	11,511	16,004	4,802	14,266
4C Special Std	17,672	15,136	2,552	9,236
4C Library Mail	3,016	2,965	1,533	1,973
4C USPS Penalty	624	888	582	1,259
Free for the Blind	306	687	1,568	1,307
International	2,294	2,289	5,381	3,727
Total	259,271	268,989	409,337	501,814

